

## SHELF LIFE OF PASTEURIZED ACETES SANDWICH AT 0 – 2<sup>0</sup> C TEMPERATURE

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### ABSTRACT

Acetes sandwich prepared by standardized recipe and method were held at temperature 0 - 2<sup>0</sup> C and subjected to biochemical, microbiological, organoleptic and physical tests at regular intervals. During chilled storage moisture content decreased, pH decreased, expressible water percentage increased, TMA and TVB-N increased and total plate count (TPC) increased. There was decrease in the organoleptic scores for all attributes during chilled storage. Based on the above results it can be concluded that the *Acetes* sandwich can be stored satisfactorily for 15 days at 0 – 2<sup>0</sup> C.

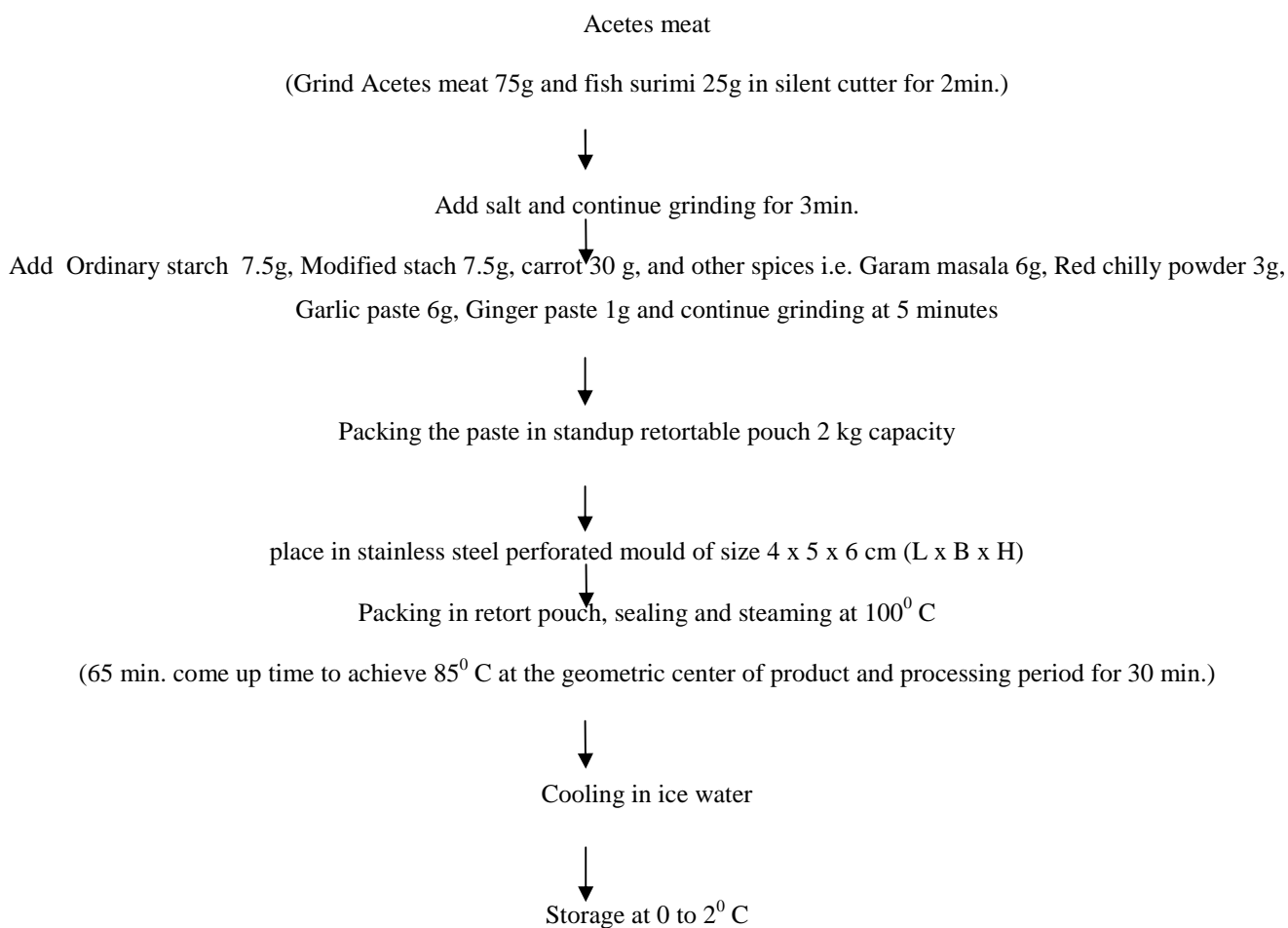
**KEYWORDS:** Acetes Sandwich, Chilled Storage, Shelf Life

### INTRODUCTION

In Maharashtra, during the year 2011-12, 53,021 tons of *Acetes* shrimp was landed contributing 16.8% to the total marine fish landing in the state. Attempts have been made to prepare *Acetes* powder (Mulbagal *et al.*, 1980 and Jagushte, 1989) and to separate flesh from *Acetes* (Garg *et al.*, 1977 and Patil, 2000). Jagushte (1989) prepared products such as sevu, noodles etc. using powdered *Acetes*. As per the prevailing practice, jawala is sundried on the beach and sold in the dried form for human consumption in the domestic market. However, functional properties of protein in fresh *Acetes* are lost after it is dried. Hence, this necessitates the use of *Acetes* in fresh condition so as to utilize all the functional properties of *Acetes* protein to the maximum extent. Fresh meat of *Acetes* can be used for the preparation of *Acetes* mince thereby retaining their desired functional properties. Similarly, the product can be prepared from fresh *Acetes* meat and stored chilled (for short duration). shelf life of pasteurized emulsion fish products index products have been studied at 0 - 2<sup>0</sup> C, such as skinless fish sausage (Desai G. B. 1999), fish bhakarwadi (Subhedar 1999), fish ball in curry (Balange 1999), kamaboko and steamed fish vada (Thorat, 1999), mackerel ball in curry (Kamat, 1999) steamed kamaboko with carrot (Farnandes, 2001). Damle *et al.* (1989) developed a cooked and dried product from *Acetes* in fresh condition. Pravin Kumar (2006) studied the shelf life of frozen *Acetes* ground meat along with lactitol cryoprotectant. Nagothkar (2013) prepared *Acetes* meat sausage and assessed its shelf life at 0 - 2<sup>0</sup> C Very few attempts have made on the utilization of fresh *Acetes* in the preparation of emulsion type products and, since no work has been done on *Acetes* sandwich, an attempt is made in the present study to find out the suitability of *Acetes* in fresh condition for the preparation of *Acetes* sandwich and assess the shelf life of sandwich under chilled condition.

### MATERIALS AND METHODS

The fresh *Acetes* immediately after catch was procured from landing center and by catch fishes, other animals and plants were removed. Whole *Acetes* was weighed and subjected to shell separation by putting in meat separator to separate shell and meat. Then the separated meat was subjected to squeezing in the thin synthetic cloth to remove excess liquid (Moisture + Solids).

**Flow Chart 1 Standardized Method of Preparation of Acetes Sandwich****Table 1: Standardized Recipe of Acetes Sandwich**

Sr.No.	Ingredients	Quantity (Gm)
1	Acetes meat	75
2	Surimi	25
3	Corn flower	15
4	Salt	2
5	Garam Masala	6
6	Red chilly powder	3
7	Garlic paste	6
8	Ginger paste	1
9	Carrot	20
	<b>Total</b>	<b>153</b>

Acetes sandwich was prepared as per the standardized recipe (Table) and method (flow chart) of Sonavane (2014). In storage study the prepared sandwich was packed in retort pouch, sealed and steamed in autoclave at 85° C for 90 minutes and in cooled in ice water at 0° C, then prepared sandwich were stored in chilled storage at 0 – 2° C in the present experiment.

The samples were drawn at regular intervals and subjected to physical test such as folding test and expressible

water as per method of Suzuki (1981), biochemical parameter such as pH, moisture as per AOAC (2005), TVB-N, TMA-N was as per procedure of Beatty and Gibbons (1937) using Conway's micro diffusion technique. Microbiological analysis (TPC) was carried out as per Collins et al. (1984) and organoleptic evaluation of Acetes sandwich was conducted as per Meilgaard et. al (1980).

## RESULT AND DISCUSSIONS

Changes in moisture content of the sandwich decreased in both control and sample from 1st day of the storage to 2nd day of the storage by 65.2 to 61.4 % for control and 1st day of storage to the 15<sup>th</sup> day of storage 65.2 to 58.4 % (Figure 1), decrease in the moisture could be due to hydrolysis of the carbohydrate by bacteria resulting in acid production (decrease in pH) and subsequently release of water from emulsion. Similarly, Nagotkhar (2013) also observed that the water content decreased in when Acetes sausage stored at chilled condition. Boyne (1989) observed that the water content decreased when the shark sausages packed in cellulose casing were stored at chilled storage. Cross and Chandrashekhar (1986), and Hegde et al. (1992) have reported a similar trend. There was gradual decrease in the folding test grades of Acetes sandwich during chilled storage. In the sample the folding test grade was much higher up to 9 days of storage as compared to those of control (kept at room temperature). The product had folding test grade up to acceptable standard up to 15 days of storage. The organoleptic score for texture correlated well with the trend observed for the folding test grade of the product. However, Farnandes (2001) has reported decreasing trend in folding test grades of fish kamaboko during chilled storage. Changes in during chilled storage from the beginning till the end of the storage, the pH of control and sample Acetes sandwich decreased gradually from 7.5 to 6.7 and 7.5 to 6.8 respectively (Figure 2). Decrease in the pH could be due to hydrolysis of the carbohydrate by bacteria with acid production. Similarly, Farnandes (2001) has reported a decreasing trend in pH of fish kamaboko. Hegde et al. (1992) and Cross and Chandrashekhar (1986) and Nagotkhar (2013) also reported decrease in pH of the during storage. Decreases in pH of the sandwich could be due to the growth of the surviving bacteria during heat processing which is reflected by increase in TPC during storage. During chilled storage there was increase in the expressible water percentage in both control and sample Acetes sandwich from 9.1 to 13.9 % and 9.1 to 10.7 % respectively (Figure 3). In the present study it was observed that increase in expressible water percentage reflected in decreased in moisture content. It is possible that reduction in pH could have affected the water holding capacity of emulsion and there by release in the moisture or in the other case expression of the water. Similarly, Nagotkhar (2013) also observed an increase in the expressible water percentage during chilled storage.

Changes in TMA and TVB-N during chilled storage, Significant variation was noticed during the storage of control and sample Acetes sandwich at 0 to 2 °C, TMA values ranging between to 0.51 to 5.8 mg N % and. 0.51 to 0.73 mg N % respectively (Figure 4). Similarly, TVB-N values showed significant variation during the storage of control and sample Acetes sandwich at 0 to 2 °C. TVB-N values (Figure 5) ranged between 7.2 to 34 mg N % and 7.2 to 10.7 mg N % respectively. Similarly, Nagotkhar (2013) also observed that there was significant increase in the TMA and TVB-N of Acetes sausage stored at chilled storage. Changes in Total Plate Count (TPC) Changes in the total plate count of the control and sample Acetes sandwich increased gradually from 1st day to 15<sup>th</sup> day. TPC of control and sample Acetes sandwich ranged between  $0.72 \times 10^2$  to  $4.9 \times 10^8$  cfu/gm and  $0.72 \times 10^2$  to  $3.6 \times 10^2$  cfu/gm respectively (Figure 6). Further, Nagotkhar (2013) also observed that there was significant increase in the TPC of Acetes sausage stored at chilled storage. Desai (1999) also reported that TPC increase during chilled storage.

Changes in organoleptic quality characteristics, the organoleptic scores decreased slightly in sample during the

period of storage and they were in an acceptable condition up to the end of 15 days (Figure 7) for sample while the control was spoiled on 2nd day. Depending upon panel assessment, Fernandes (2001) concluded that the chilled stored fish kamaboko were acceptable up to 12 days of storage period. Considering the changes in biochemical, microbiological and organoleptic quality characteristics it can be concluded that Acetes sandwich can be stored at 0 to 2°C for 14 days, although the sandwich were acceptable up to 15<sup>th</sup> day, as a safety margin 1 days prior to that has been considered. Similar observation have been made i.e. gradual reduction in quality characteristic of the product stored at 0 to 2°C from 1<sup>st</sup> day to 12<sup>th</sup> day during storage of fish ball in curry packed in trend pack pouches. (Balange, 1999). Light et al. (1988) have reported that the cooked chilled fish product has a shelf life of 14 days at 1 to 3<sup>0</sup> C (acceptable up to 14 days). Generally, the kamaboko is ready to eat product and consumed immediately after preparation. It has been noticed that kamaboko can be stored for 7 – 9 days in spring and autumn and for 1 -2 days only in summer (Suzuki, 1981).

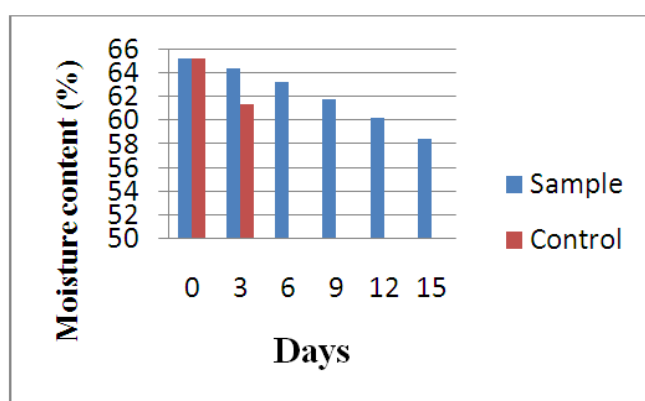


Figure 1: Changes in Moisture Content of Acetes Sandwich during Chilled Storage

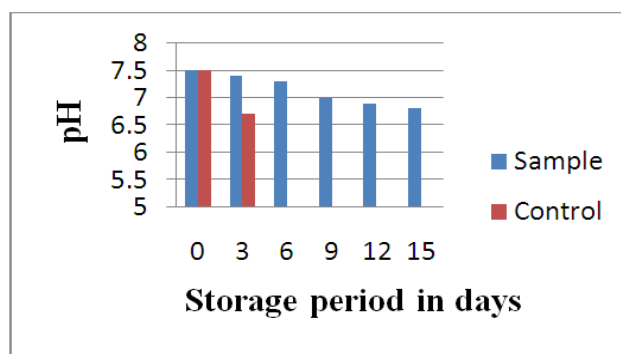


Figure 2: Changes in Ph of Acetes Sandwich during Chilled Storage

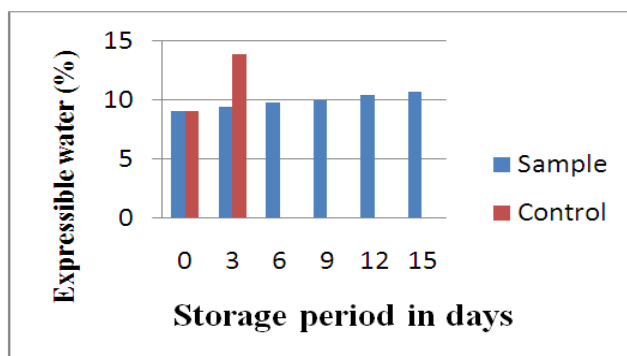
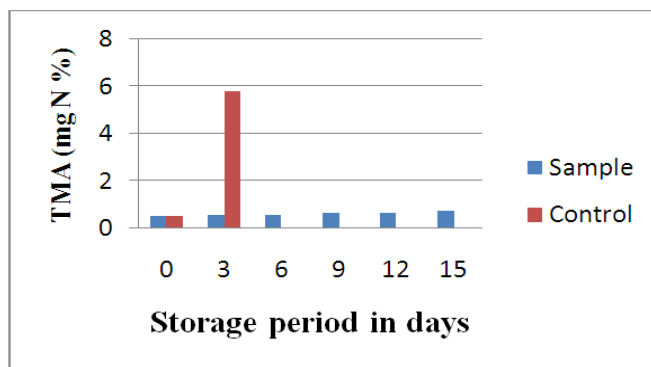
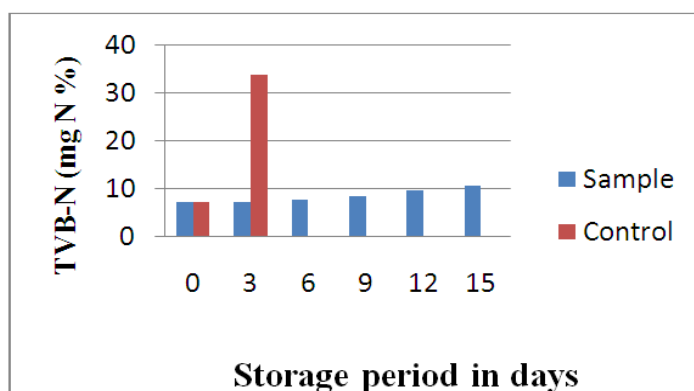
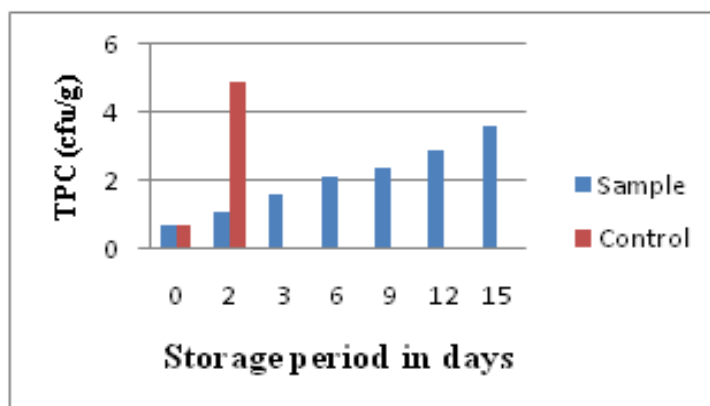
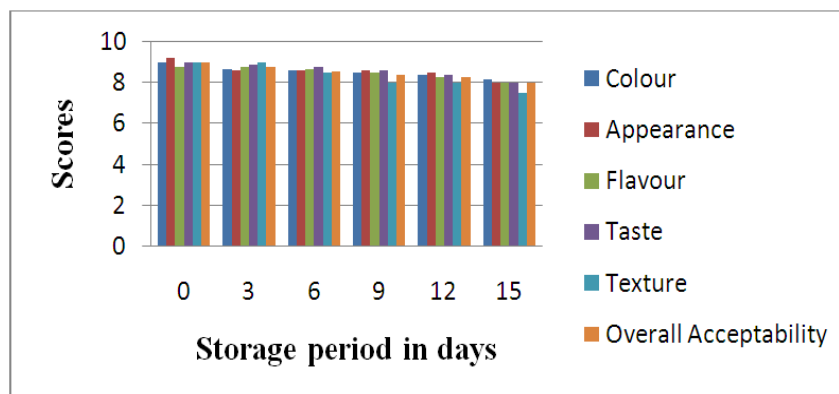


Figure 3: Changes in Expressible Water Percentage of *Acetes* Sandwich during Chilled Storage

Figure 4: Changes in TMA of *Acetes* Sandwich during Chilled StorageFigure 5: Changes in TVB-N of *Acetes* Sandwich during Chilled StorageFigure 6: Changes in TPC of *Acetes* Sandwich during Chilled StorageFigure 7: Changes in Organoleptic Scores of *Acetes* Sandwich during Chilled Storage

## CONCLUSIONS

Based on the biochemical, microbiological, organoleptic and physical tests, it was observed that during chilled storage moisture content decreased, pH decreased, expressible water percentage increased, TMA and TVB-N increased and total plate count (TPC) increased. There was decrease in the organoleptic scores for all attributes during chilled storage. Based on the these observation it can be concluded that pasteurized and Chilled Acetes sandwich can be stored satisfactorily for 15 days at 0 – 2<sup>0</sup> C temperature.

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